

## DETAILED DESCRIPTION

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### SMALL FORM FACTOR PLUGGABLE OPTICAL TRANSCEIVER MODULE

#### TECHNICAL FIELD

This invention refers to a kind of opto-electrical conversion component used in fiber data communication and telecommunication.

#### BACKGROUND TECHNOLOGY

Currently in the SFP optical transceiver, the locating mechanism for optical transmitting and receiving component is directly attached to the case body. Due to difference of manufacturer and parameters, there are various structures of optical transmitting and receiving components. For application of these different components, the corresponding locating mechanism and the entire structure of the case body requires relevant modification, which leads to a long R&D period and high cost. In addition, current SFP form factor package usually adopts the unlocking mechanism of pushing the wedge shaped part inward and the inclined plate of the wedge shaped part pushing the upper section of the receiving cage to unlock. This prior-art mechanism is of great friction, and once the wedge shaped part is pushed to the unlocking position, it's possible for the module to stay in the unlocking state. This can only be recovered manually or may lead to unsafety in operation. This prior-art mechanism is usually in the open state and exposed to the outward, which the mechanism will easily get interfered by other things; furthermore, the overall appearance is disorderly, and safety, usability and reliability are low.

#### CONTENT OF INVENTION

The present invention is to provide a kind of hot pluggable SFP optical transceiver module that's of high reliability, easy to use and maintain and of neat appearance.

This practical new type of SFP optical transceiver includes a case body, a sheet metal cover associated with first end of the case body, a case cover and a bottom cover associated with second end of case body, an electrical interface and an optical interface associated with the two ends of the case body respectively, an optical component locating mechanism and an automatic restoring unlocking mechanism; wherein, the sheet metal cover has a triangular shaped locking detent on it, and the function of the triangular shaped locking detent is when plugging the module into the receiving cage, the locking detent pushes the upper section of the receiving cage upward and locks to the triangular shaped locking hole in the receiving cage and therefore locates the module in the normal operating position. The electrical interface comprises an SFP Agreement compliant PCB located inside the case body with 20 copper foils on it and the electrical interface is to be plugged into a receptacle of the receiving cage when using; optical interface comprises a cavity, SFP agreement compliant optical components located in the cavity and fixed by the optical component locating mechanism, and two LC fiber connectors are plugged into optical interface when using; optical component locating mechanism includes a rack fixed inside the case body and a retainer adapted to the rack. The rack and the retainer form a cavity and retain optical component inside, which can correctly and reliably locates the optical component. Hence, when optical component is required to change, it needs only to develop a new pair of rack and retainer to locate the optical component not to change the structure of the case body. This can lower cost and enhance

capability to upgrade; automatic restoring unlocking mechanism includes rails attached to the case body and case cover, a wedge shaped part sliding along the rails, a restoring spring hitched to spring locking pin of wedge shaped part, a spring baffle located inside the case body and associated with both ends of the restoring spring, a lever whose shaft fixed to the hole between the case body and case cover, a sleeve on the lever, wherein the inclined plate of the wedge shaped part comes into contact with the crank part of the lever. When unlocking, the lever rotates around the shaft to a horizontal position and pushes the wedge shaped part sliding forward to allow the triangular shaped locking detent to be released from the locking hole of the receiving cage. When the lever is not under manual control, the force of restoring spring pushes the wedge shaped part back to its normal (first/original) position, meanwhile the lever restores to its original vertical position; in order to combine the sheet metal cover and bottom cover and case body tightly, both sides of the sheet metal cover and bottom cover have holes and both sides of the case body have detents adapted to those holes. When putting the sheet metal cover, bottom cover and case body together, the detents on the case body lock to the holes in both the sheet metal cover and bottom cover; there are dents on both sides of the sheet metal cover using for tightly pressing the PCB, and there are small bulges in front section of both sides of sheet metal cover to guide the module when plugging the module into the receiving cage and to keep the module in good electrical connection with the receiving cage. To guarantee the module in good electrical connection with and reliably locked to the receiving cage, there is a spring baffle attached to bottom cover; the locating fastener/bolt enters outward from inside of the end of case body that's associated with optical interface and fixes the case cover onto the case body, and the locating fastener/bolt cannot be seen outside and therefore make a good appearance for the module; in addition, for convenience of connection, there are marks with abbreviation of 'Rx' and 'Tx' indicating receiver and transmitter at the end of optical interface in the case body. This kind of mark that takes the place of the current triangle mark is simple and can be correctly understood and identified.

The working theory of this new practical type of SFP optical transceiver module is: push the module into the receiving cage to install, make the electrical interface slide into the SFP receptacle till the triangular shaped locking detent attached to the sheet metal cover locks to the triangular locking hole in the receiving cage, and then plug the LC fiber connector into the optical interface.

Advantages of this practical new type of SFP optical transceiver module lies in that, comparing to the existing SFP module, it's of smaller size, more modules can be placed in same application, it's of simpler structure with plugging and inserting connection methods at both ends for outward connection, it's hot pluggable, it owns the restoration function when unlocking, and it's of lower price, higher performance-to-price ratio, higher reliability and safety, and more convenient to use and maintain. This module is mainly used as opto-electrical conversion part in fiber data communication and telecommunication.

## SPECIFIC REALIZATION

FIG. 1 is a perspective view of optical transceiver module in accordance with the present invention.

FIG. 2 is a detailed perspective view of structure of automatic restoring unlocking mechanism of FIG.1.

FIG. 3 is a cross sectional view of structure of optical component locating mechanism of FIG.1.

FIG. 4 is a 90° rotated perspective view of FIG. 1.

FIG. 5 is a perspective view of sheet metal cover.

FIG. 6 is a perspective view of case body.

FIG. 7 is a perspective view of bottom cover.

This practical new type of SFP optical transceiver includes a case body 1, a sheet metal cover 2 associated with first end of the case body 1, a case cover 3 and a bottom cover 4 associated with second end of case body 1, an electrical interface and an optical interface associated with the two ends of the case body 1 respectively, an optical component locating mechanism and an automatic restoring unlocking mechanism; wherein, the sheet metal cover 2 has a triangular shaped locking detent 5 on it. The electrical interface comprises a PCB 6 located inside the case body 1 with 20 copper foils on it; optical interface comprises a cavity 7, optical component 8 (part 8 stands for both the receiving and transmitting component) located in the cavity 7 and fixed by the optical component locating mechanism; optical component locating mechanism includes a rack 9 fixed inside the case body 1 and a retainer 10 adapted to the rack 9, wherein the rack 9 and the retainer 10 form a cavity; automatic restoring unlocking mechanism includes rails attached to case body 1 and the case cover 3 and a wedge shaped part 11 to slide along the rails, a restoring spring 13 hitched to the spring locking pin 12 of the wedge shaped part 11, a spring baffle 14 located inside the case body 1 and associated with both ends of the restoring spring 13, a lever 15 whose shaft fixed to the hole in the case body 1 and case cover 3, and a sleeve 25 on the lever 15, wherein the inclined plate of the wedge shaped part 16 comes into contact with the crank part of the lever 17; both sides of the sheet metal cover 2 and bottom cover 4 have holes 18 and both sides of the case body 1 have detents 19 adapted to the holes 18; there are dents 20 on both sides of the sheet metal cover 2; there are small bulges 24 on both sides of sheet metal cover 2; there is a spring baffle 21 attached to the bottom cover 4; there are locating fasteners/bolts 22 for case cover 3 located at the end of the case body that's associated with optical interface inside the case body 1 at the optical interface side; the end associated with the optical interface of case body 1 has transmitting and receiving marks of 'Rx' and 'Tx' 23.

## SUMMARY

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This practical new type is to provide a small form factor pluggable optical transceiver including a case body, a sheet metal cover, a case cover and a bottom cover, an electrical interface and an optical interface associated with the two ends of the case body respectively, an optical component locating mechanism and an automatic restoring unlocking mechanism, wherein, optical component locating mechanism comprises a changeable rack and retainer that can easily retain all kinds of optical components. Automatic restoring unlocking mechanism makes the wedge shaped part restore to its original position. This kind of module is of small volume and high reliability, easy to use, and convenient to maintain, plug and unplug. It is mainly used as opto-electrical conversion component in fiber data communication and telecommunication.

## CLAIMS

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1. A Small Form Factor Pluggable Optical Transceiver Module includes a case body, a sheet metal cover associated with first end of the case body, a case cover and a bottom cover associated with second end of case body, an electrical interface and an optical interface associated with the two ends of the case body respectively, an optical component locating mechanism and an automatic restoring unlocking mechanism, wherein electrical interface comprises a printed circuit board (PCB) with 20 copper foil strips assembled at its end and optical interface comprises optical components located by an optical component locating mechanism and features in the optical component locating mechanism comprising a rack fixed in the case body, a retainer adapted to the rack and the cavity formed by the rack and retainer; unlocking mechanism is a kind of automatic restoring unlocking mechanism, and it comprises rails attached to the case body and case cover, a wedge shaped part sliding along the rails, a restoring spring hitched to spring locking pin of wedge shaped part, a spring baffle located inside the case body and associated with both ends of the restoring spring, a lever whose shaft fixed to the hole between the case body and case cover, a sleeve associated with the lever, wherein the inclined plate of the wedge shaped part comes into contact with the crank part of the lever.
2. The SFP optical transceiver module of claim 1, wherein there are holes in both sides of the sheet metal cover and bottom cover, and detents on both sides of the case body adapted to the holes.
3. The SFP optical transceiver module of claim 1, wherein there are dents on both sides of the sheet metal cover and a locking triangular shaped detent on top of sheet metal cover and a bulge on each side of sheet metal cover that is close to one end of the sheet metal cover.
4. The SFP optical transceiver module of claim 1, wherein the bottom cover comprises a spring baffle.
5. The SFP optical transceiver module of claim 1, wherein the locating fastener/bolt enters outward from inside of the end of case body that's associated with optical interface and fixes the case cover onto the case body.
6. The SFP optical transceiver module of claim 1, wherein the end associated with the optical interface of case body has transmitting and receiving marks of 'Rx' and 'Tx'.

# 说明书附图

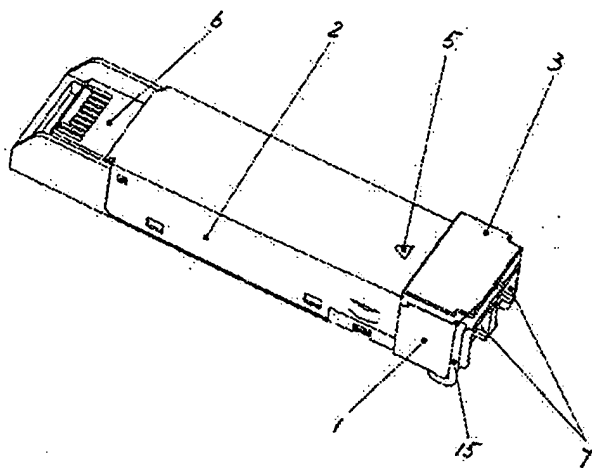


图 1

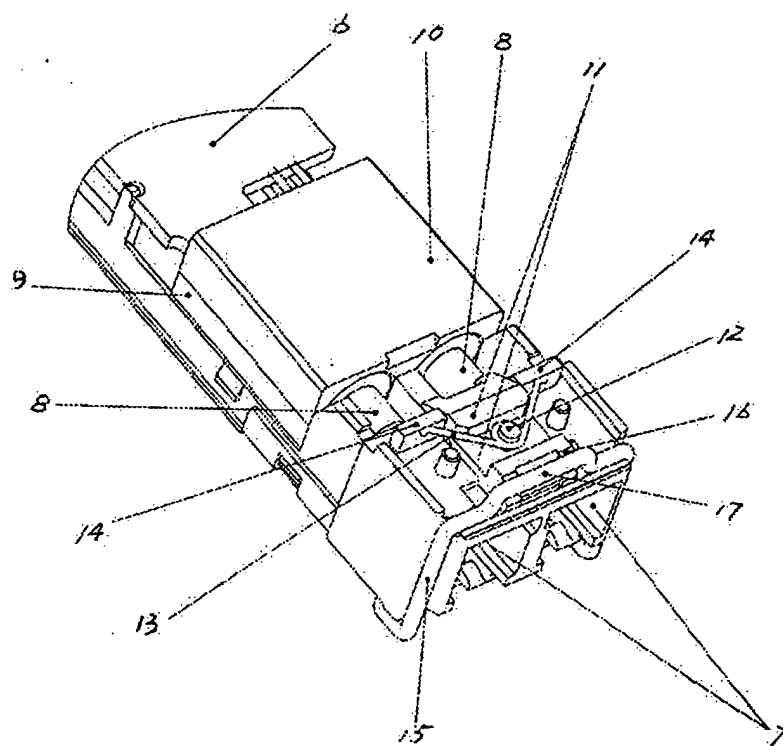


图 2

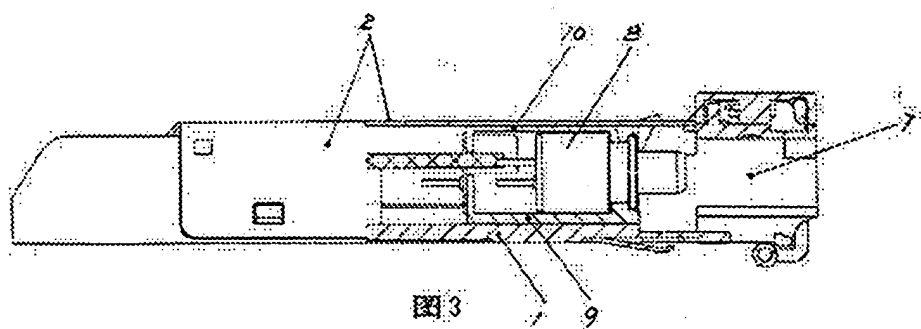


图3

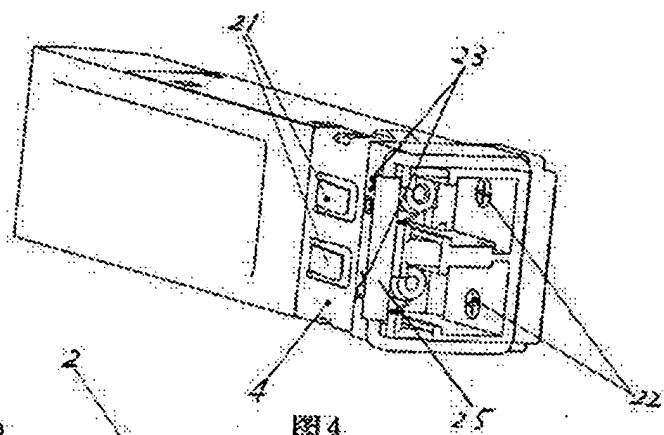


图4

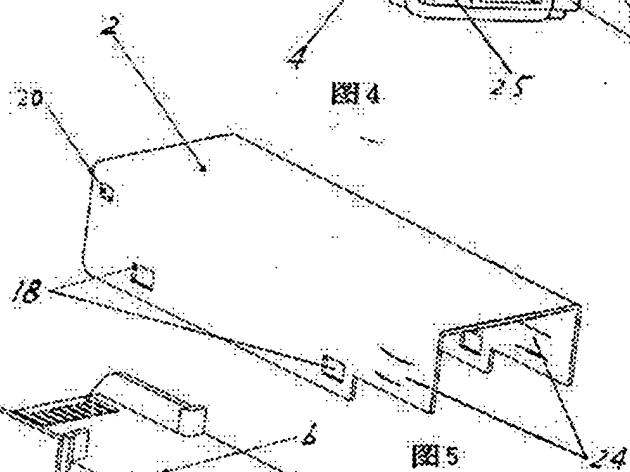


图5

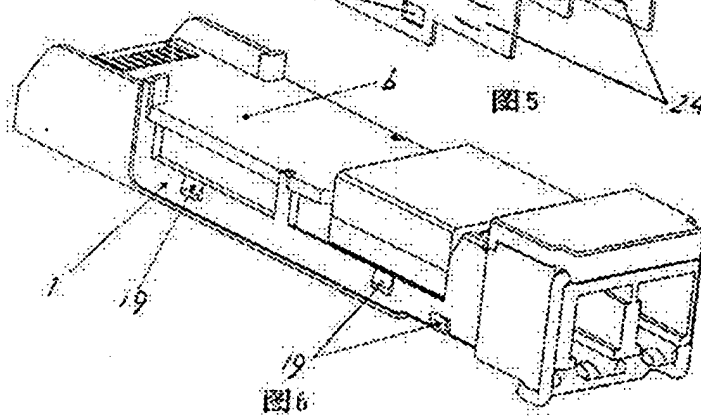


图6

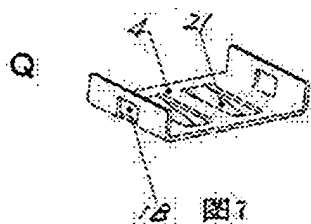


图7

## 说明书摘要

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本实用新型提供一种小型可插拔光收发模块包括盒体、钣金壳件、盒盖和下壳件，分别设置在盒体两端的电口和光口，以及光器件定位结构和自动复位解锁机构，其中，光器件定位结构由可更换的支座和压块组成，能方便地固定各种光收发器件。自动复位解锁机构能使楔形件自动恢复到原位。该模块体积小，可靠性高，使用性、维修性好，能快速插拔。主要用作光纤通讯和电信通讯中光电转换器件。



## 权 利 要 求 书

1、一种小型可插拔光收发模块，包括盒体，与盒体一端配合的钣金壳件，与盒体另一端配合的盒盖和下壳件，分别设置在盒体两端的电口和光口，以及光器件定位结构和解锁机构，其中，电口由设置在盒体内其后端加工有20条铜箔带的电路板构成，光口由腔体及设置在腔体内并通过光器件定位结构固定的光收发器件构成，其特征在于光器件定位结构由固定在盒体内的支座，以及与支座配合的压块组成，支座与压块形成空腔，解锁机构是自动复位解锁机构，它由设置在盒体及盒盖的导轨内且与其滑动配合的楔形件，固定在楔形件心轴上的复位弹簧，设置在盒体上并与复位弹簧两端配合的弹簧挡板，其转轴定位于盒体与盒盖间小孔内的拉杆，以及与拉杆相配的套管组成，楔形件的端部斜面与拉杆曲轴部位的圆周接触。

2、如权利要求1所述的小型可插拔光收发模块，其特征在于钣金壳件及下壳件的两侧有孔，盒体两侧有与孔配合的凸台。

3、如权利要求1所述的小型可插拔光收发模块，其特征在于钣金壳体两侧设置有内凹形小台，钣金壳件前上方有锁定三角凸块，钣金壳件前端两侧各有一凸包。

4、如权利要求1所述的小型可插拔光收发模块，其特征在于下壳件上设置有瓷片。

5、如权利要求1所述的小型可插拔光收发模块，其特征在于盒盖的定位螺钉由盒体光口内侧进入，将盒盖固定在盒体上。

6、如权利要求1所述的小型可插拔光收发模块，其特征在于盒体光口一端设置有标记为“Rx”和“Tx”光收发标志。

## 小型可插拔光收发模块

### 技术领域

本实用新型涉及一种光纤数据通讯及电信通讯中的光电转换器件。

### 背景技术

目前,小型可插拔光收发模块(SFP),其光收发器件的定位结构是直接盒体上加工出来,因为厂家及参数不同,光收发器件的结构千变万化,为了与这些光收发器件相适配,其相应的定位结构及整个盒体结构需作相应修改,从而导致研制周期长,成本高。此外,目前 SFP 封装普遍采用的解锁机构是用楔形件推入,以斜面顶开笼子锁扣解锁,此种机构有较大磨擦力,楔形件一旦推入解锁位置后,仍有可能滞留在该状态,只能靠手动恢复,否则模块有脱出的可能,而且这种解锁机构一般为敞开状态,机构外露,易与外界物件发生意外相互干扰,且外观较乱,其安全性、使用性及可靠性较差。

### 发明内容

本实用新型的目的在于提供一种可快速、方便插拔,性能可靠,使用性、维修性良好,且外观整洁的小型可插拔光收发模块。

本实用新型小型可插拔光收发模块包括盒体,与盒体一端配合的钣金壳件,与盒体另一端配合的盒盖和下壳件,分别设置在盒体两端的电口和光口,以及光器件定位结构和自动复位解锁机构,其中,钣金壳件上有锁定三角凸块,其作用是当模块插入笼子时,该锁定三角凸块顶推笼子上侧,继而卡入笼子上侧的三角口定位,将模块锁定在正常工作位置。电口由设置在盒体内其后端加工有 20 条铜箔带的电路板构成,符合 SFP 协议,使用时电口插入一个 SFP 插座;光口由腔体,设置在腔体内并通过光器件定位结构固定的光收发器件构成,符合 SFP 协议,使用时二个 LC 光纤连接器插入光口;光器件定位结构由固定在盒体内的支座,以及与支座配合的压块组成,支座与压块形成空腔,光收发器件置于空腔内,以保证光收发器件正确和可靠定位,同时,当换用其它光收发器件时,只需重新研制一组对应的支座和压块,便能将其固定在盒体内,不需改变盒体结构,可降低成本,提高升级换代能力;自动复位解锁机构由设置在盒体及盒盖的导轨内且与其滑动配合的楔形件,固定在楔形件心轴上的复位弹簧,设置在盒体上并与复位弹簧两端配合的弹

2上有锁定三角凸块5，电口由设置在盒体1内其后端加工有20条铜箔带的电路板6构成；光口由腔体7，设置在腔体7内并通过光器件定位结构固定的光收发器件8（8为接收发射两个器件）构成；光器件定位结构由固定在盒体1内的支座9，以及与支座9配合的压块10组成；支座9与压块10形成空腔；自动复位解锁机构由设置在盒体1及盒盖3的导轨内且与其滑动配合的楔形件11，固定在楔形件11的心轴12上的复位弹簧13，设置在盒体1上并与复位弹簧13两端配合的弹簧挡板14，其转轴定位于盒体1与盒盖3间小孔内的的拉杆15，以及套在拉杆15上的套管25组成，楔形件11的端部斜面16与拉杆曲轴部位17的圆周接触；钣金壳体2及下壳体4的两侧开有孔18，盒体1两侧有与孔18配合的凸台19；钣金壳体2两侧还设置有内凹形小台20，钣金壳体2前端两侧有凸包24；下壳体4上设置有簧片21；盒盖3的定位螺钉22位于盒体1光口内侧；盒体1上光口一端设置有“Rx”和“Tx”光收发标志23。